

# Raingarden/Bioswales at Tower Lakes

## Section 319 Project Report

Illinois EPA Section 319 Uniform Grant Agreement# 3191615



Illinois Environmental Protection Agency  
Bureau of Water  
Watershed Management Section  
July 2019



**Raingarden/Bioswales at Tower Lakes  
PROJECT EVALUATION AND FINAL REPORT**

**ILLINOIS EPA Uniform Grant  
Agreement (UGA) # 3191615**

**July 2019**

**Prepared For:**

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
BUREAU OF WATER - WATERSHED MANAGEMENT SECTION  
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This report was prepared using United States Environmental Protection Agency funds under Section 319 of the Clean Water Act distributed through the Illinois Environmental Protection Agency. The findings and recommendations contained herein are not necessarily those of the funding agencies.

# Raingarden/Bioswales at Tower Lakes

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## **Project Summary:**

The Tower Lakes Raingardens and Bioswales project was funded in part through USEPA's Section 319(h) of the Clean Water Act funds administered through Illinois EPA. The Village of Tower Lakes (The Municipality) and Tower Lakes Improvement Association (The Homeowners Association and landowner) jointly desired to achieve three major goals for Tower Lakes as a community.

The project objectives were:

1. Reduce non-point source pollution reaching the lake and the aquifers below the lake, from unfiltered storm water runoff running directly into the lake, and the subsequent consequences of pollutants and nutrients entering the lake.
2. Reduce volume of storm water entering the aging infrastructure of the drainage systems of the village but detaining and infiltrating storm water through the construction of bioswales and raingardens
3. Increase community awareness of the positive impact of raingardens and bioswales in the community, through education and demonstration, with the goal of encouraging the construction of smaller projects within private households.

This multiyear three-phase project took place between the Grant Application in 2015, with its subsequent award in 2016, through to its completion in July of 2019. The first phase involved the construction of an engineered raingarden in Bays Pk, which was completed and opened on July 4<sup>th</sup> 2017. Phases two and three involved the construction of an engineered raingarden and the restoration of a natural wetland area in Wagner Pk which was opened in July of 2019.

Selected non-point source pollutant loading reduction benefits include but are not limited to the following: Sediment Load Reduction = 188.5 tons / year; Total Phosphorus Reduction = 712 lb / year; Total Suspended Solids Reduction = 370,200 lbs/yr; Total Nitrogen Reduction = 4,354 lb / year.

In addition to the involvement of the Village of Tower Lakes and Tower Lakes Improvement Association, this project had the active involvement and support of the Tower Lakes Drain Partnership, The Nine Lakes Partnership, Barrington Area Conservation Trust, Illinois Lake Management Association and Lake County Storm Water Management Council. Prior to this project starting only two households had registered their gardens with BACT for their "Conservation@Home" certification and only two had constructed raingardens on their properties.

At the completion of the project there are nearly 20 registered with BACT and more than 10 with raingardens. Public awareness has been raised through the visibility of the projects, town hall meetings, frequent newsletter articles, presentations at Lake County, ILMA, and other lake and conservation organizations in N Illinois, and the strategic placement of signage.

The Village of Tower Lakes and Tower Lakes Improvement Association will maintain the gardens, bioswales and restored wetlands through a combination of professional maintenance and volunteer involvement.

## **Project Introduction:**

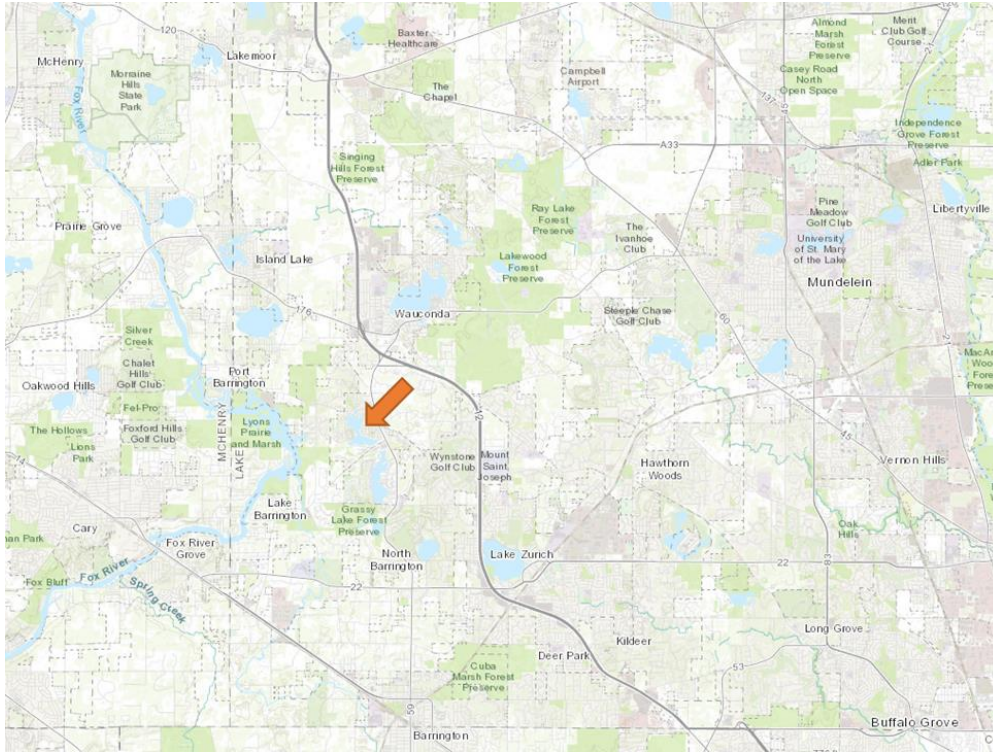
The Village of Tower Lakes is located in Southwestern Lake County, Northeastern Illinois. The small community is located in the Tower Lakes Drain, a sub-unit of the 9-Lakes Watershed. The Village features two primary lakes totaling approximately 90 acres total and several small streams that enter the lakes and ultimately exit via a dam at the southern end that leads to the Fox River. The topography of the community is such (a 30 foot elevation drop in some areas) that all the overland flow of water leads to the lake directly, either over permeable surfaces, through culverts, or over turf grass swales. This is a community with septic systems, only a few sewers, and mostly turf vegetated swales leading to the lake. Tower Lakes is present on the EPA 303d list for impaired inland lakes for Phosphorus, Fecal Coliform Total Suspended Solids, and Aquatic plants.

Traditionally, the village dealt with flooding, pollution and run-off through grey infrastructure improvements, and cleaning of drains and chemical treatment of aquatic plants. Over time, working with local conservation teams, and through education of the community, green infrastructure trends were embraced. Involvement in the process of creating the watershed plan allowed for the community to engage in planning efforts in a fresh way. With the advent of the planning efforts, prioritizing and working cooperatively, the village was able to set realistic goals and objectives that could easily be embraced by the community and make future planning possible.

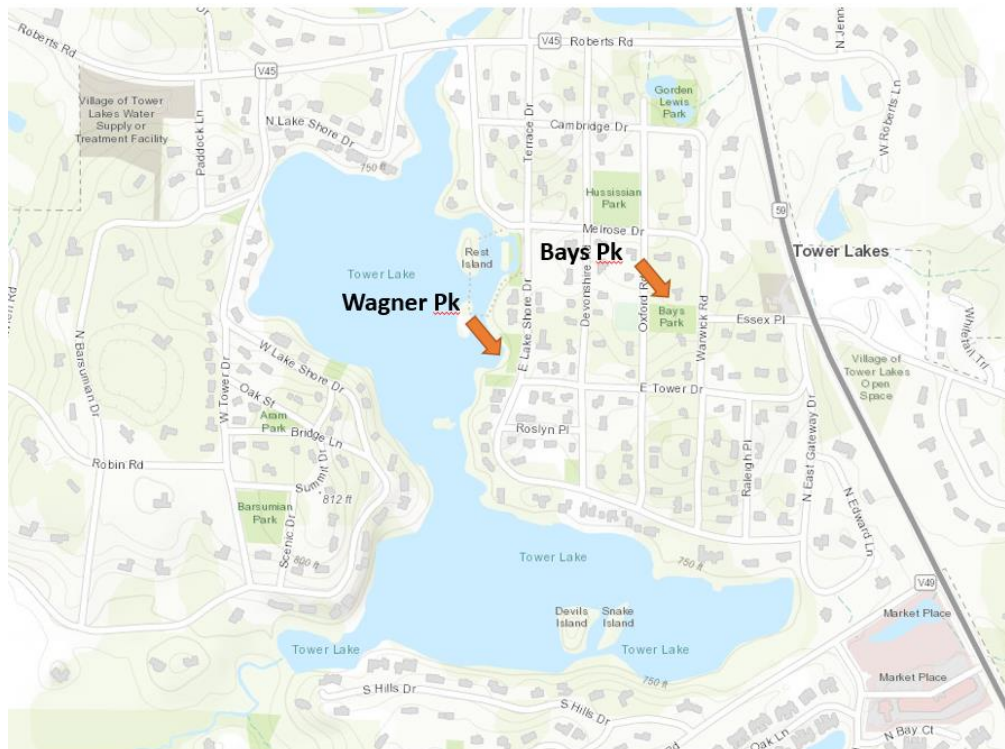
This project involves a partnership between the Village of Tower Lakes, the Tower Lakes Improvement Association (who manage the community open space), the Tower Lakes Drain Partnership (a collaboration of 4 area lakes), and a local conservation organization, Barrington Area Conservation Trust, and Illinois Lakes Management Association.

The funding request allowed for the creation of 2 large raingardens/bioswales and the restoration of a wetland adjacent to the lake that one of the raingardens will feed into. The bio- swales will be located in the center of the community and were selected to serve as demonstration sites for both the watershed group and the community. Both sites will allow for the storage and infiltration.

**Illustration #1a - Location of Tower Lakes within NW Lake County**



**Illustration #1b - Location of Raingardens within Tower Lakes**



- Wagner Park garden measures 4971 SF. Storage volume will be 4,320 CF, Saturated infiltration rate will be 16 inches/hour.
- Bays Park garden measures 7798.6 SF. Storage volume will be 12,340 CF, saturated infiltration rate will be 16 inches/hour.

### **Project Schedule**

Table 1 below indicates the project schedule and completion requirements.

**Table #1 - Project Schedule Raingardens/Bioswales of Tower Lakes. Illinois EPA UGA# 3191615.**

<b>Action Item</b>	<b>Start Date</b>	<b>Completion Date</b>
FAA 3191609 Award	Aug. 25, 2016	July 31, 2019
Design Engineering	Sept 1, 2016	Nov 1, 2016
Permitting and Landowner Agreements	Sept 1, 2016	Oct 31, 2018
Construction and Implementation	Apr 1, 2017	Jun 30, 2019
Education Program	Aug 25, 2016	July 31, 2019
Project Evaluation and Final Report	May 31, 2019	Jul 31, 2019
Other activities inc signage installation, O&M Plan, quarterly reports, DECI inspections etc	Aug 25, 2016	July 31, 2019

## **Project Discussion:**

Each site was selected for the volume of run-off received, the soils and the best design to reduce local pollutant loads. Final designs reflected the goals to capture, treat, and slow down overland flow from surrounding homes, streets, and impervious surfaces.

Benefits and results include: improved water quality locally and downstream, increased groundwater filtration, infiltration, soil stabilization and reduction in sediment loads on surrounding water resources, as a bonus the region will also see improved wildlife habitat, and improved aesthetics.

In addition to the construction of two engineered raingardens and bioswales the project also included the restoration of 0.4 acres of wetland that is adjacent to the bio- swale in Wagner Park. This restoration was necessary to continue the treatment train of water coming out of the bio-swale and to absorb and filter the water prior to it entering the lake. Prior to the restoration the area was covered in turf grass with a temporary platform crossing the site to allow walkers to avoid the spongy nature of the ground. Additionally, the project included an education component.

A major goal of these projects was to see private landowners embrace the idea of raingardens and install them on their own property to contribute to the prevention of pollution in the lake.

The BMP techniques used follow current protocol for raingarden creation. The gardens were created over the course of three years. The first raingarden was located in Bays Park in the central east portion of the village. Drops in elevation, from the busy Rte 59 to the park equal 10-15 feet. The second raingarden was installed in Wagner Park at the base on the east side of the lake at the base of the slopes leading from Rte. 59. The elevation change is approximately 30 feet leading to the park. Adjacent to Wagner Park, is the wetland restoration project. This location was recommended to allow for additional run-of improvements and to compliment the rain-garden being built directly east of the wetland. The wetland provides filtration and reduce pollutant loads.

Education is a critical component to this project. This included newsletters through the community, presentations at Illinois Lake Management Association annual conference, Tower Lakes Drain Partnership meetings, and Village and local association meetings. Additionally, displays will be prepared for the community festivals and work days. This is a community project and members were encouraged to volunteer their time and consider raingardens for their own properties.



**Illustration #2a - Original Perspective of Wagner Park (aka East Boat Landing)**



Wagner Park as it looks spring 2015. Raingarden will replace bulk of the turf grass in front of the oak tree, and the wetland to the right was restored.

**Illustration #2b - Original Perspective of Bays Park**



Bays Park as it looked in Spring 2015 facing west.  
Raingarden was installed in green space.

The project was carried out primarily by contractors since the creation of engineered raingardens and bioswales was felt to be too specialized for volunteer labor. The selection of the contractor partner was facilitated through RFP and the final decision made based on criteria including references, presentation, bid fit to specification and price. Much emphasis was placed on the past history of similar size projects and track record within Lake County. Site visits were performed.

## Project Results:

### Preconstruction

#### Permitting

Both Bays Pak and Wagner Park required extensive and different permitting processes. Both areas received Wetland Delineations and both had portions of the area designated wetland (appendix 1 Wetland Delineations for Bays Pk and Wagner Pk). For Bays Pk there was an application for jurisdiction submitted to Army Corps of Engineers (ACE) and Lake County Storm Water Management Council (SWMC). After review ACE adjudged that the area fell under Lake County jurisdiction. The proximity of Wagner Pk to the lake, which is a designated headwater of the Mississippi dictated that it fell under Army Corps jurisdiction. Both areas needed a letter of non-objection from IL DNR confirming that no endangered species were at risk from the projects and both areas needed local Village building permits to support the construction.

For Bays Pk a Wetland Development Plan (WDP) was submitted and after several meetings with the County a WDP Permit was obtained. A Designated Erosion Control Inspector (DECI) was appointed to oversee the satisfactory management of sediment run off, and frequent inspections were scheduled.

For Wagner Pk an ACE Permit was obtained. As part of the ACE Permit a Lake County SWMC WDP was required also and a DECI was appointed.

All Permits were posted appropriately.

#### Illustration #3 - Permits



## Signage

Appropriate signage recognizing the generous support of the EPA 319(h) Grant, and the support of Lake County SWMC Grants was created and displayed at both sites for the duration of the contract period

## Illustration #4 - EPA Signage



This Raingarden/Bioswale is a project of the Tower Lakes Improvement Association partnership with the Village of Tower Lakes. This project will protect water quality and manage stormwater as recommended in the 9-Lakes Watershed Plan.

Funding for this project is provided in part by grants from Lake County Stormwater Management Commission through a Watershed Management Board Grant and Illinois Environment Protection Agency Section 319 grant funds.



## Signage on display in both directions at Bays Pk







Signage on display at Wagner Pk



## Bidding and Contractor/Partner Selection

Being a municipality the selection of the right environmental engineering company as a partner for these projects was subject to a high degree of oversight and transparency. With the help of the Village Attorney, a formal RFP was constructed and contractors were invited to bid via advertising in the IL Herald and through personal invitation. Prevailing wages were essential and the bid opening and contractor selection process followed was complaint with law.

In total 5 bids were received in time for consideration ranging in costs from \$57k to \$386k. Two contractors were eliminated as being way beyond the budget and the remaining three were invited in to make presentations. Weighted score cards were developed and the selection team was created from key stakeholders from the Village and the Homeowners Association. From the presentations, a unanimous selection was made of ENCAP as the Environmental Engineering Company that best met the requirements of the bid, and who had by far the strongest references from similar projects across IL. A three-year contract was executed to include three phases with milestone payments and performance gates. The contract also included two years of maintenance for each garden. For reference, the Environmental Engineering company performance has met all of the milestones and expectations of the project. <http://www.encapinc.net/>

**Table #2 - Project Bids**

	Tower Lakes Raingarden - Financial Summary						
	Phase I Construction	Phase 1, 2 year maintenance	Phase 1 total	Phase 2 Construction	Phase 2, 2 year maintenance	Phase 2 total	Total
Contractor #1	\$ 29,170.00	\$ 4,940.00	\$ 34,110.00	\$ 18,300.00	\$ 4,940.00	\$ 23,240.00	\$ 57,350.00
Contractor #2	\$ 61,300.00	\$ 13,600.00	\$ 74,900.00	\$ 51,192.50	\$ 11,000.00	\$ 62,192.50	\$137,092.50
Contractor #3	\$ 64,855.00	\$ 26,500.00	\$ 91,355.00	\$ 48,348.75	\$ 23,500.00	\$ 71,848.75	\$163,203.75
Contractor #4	\$108,000.00	\$ 15,000.00	\$123,000.00	\$ 87,000.00	\$ 14,000.00	\$101,000.00	\$224,000.00
Contractor #5	\$251,000.00	\$ 11,000.00	\$262,000.00	\$ 115,000.00	\$ 9,000.00	\$124,000.00	\$386,000.00

## Community Preparedness

In order to ensure strong acceptance of the conversion of two previously turfed areas of parks to Engineered Raingardens and Bioswales a number of newsletter articles, individual mailings, town hall meeting and door-to-door visits were created, performed and delivered. Our previous community experience with other projects, where this level of awareness had not been raised, and advice from other similar raingarden projects in neighboring communities, indicated that raising the level of awareness across the community and getting support of immediate neighbors were critical success factors. Tower Lakes would agree with that, and found that support went from passive acceptance to active enthusiastic engagement in the project, as a result.



## Illustration #5- Invitation to town hall meeting



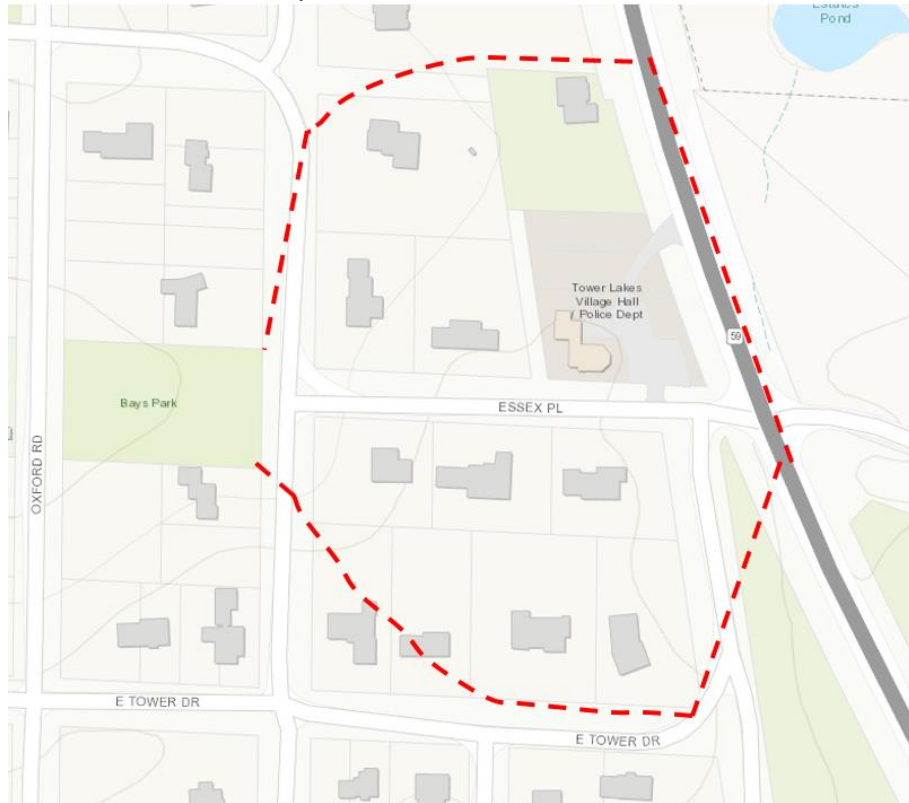


## Construction

### Phase One - Bays Park Raingarden and Bioswale.

The design and location of this garden was such that it would catch runoff from IL59 and a catchment area of approx. 25 acres.

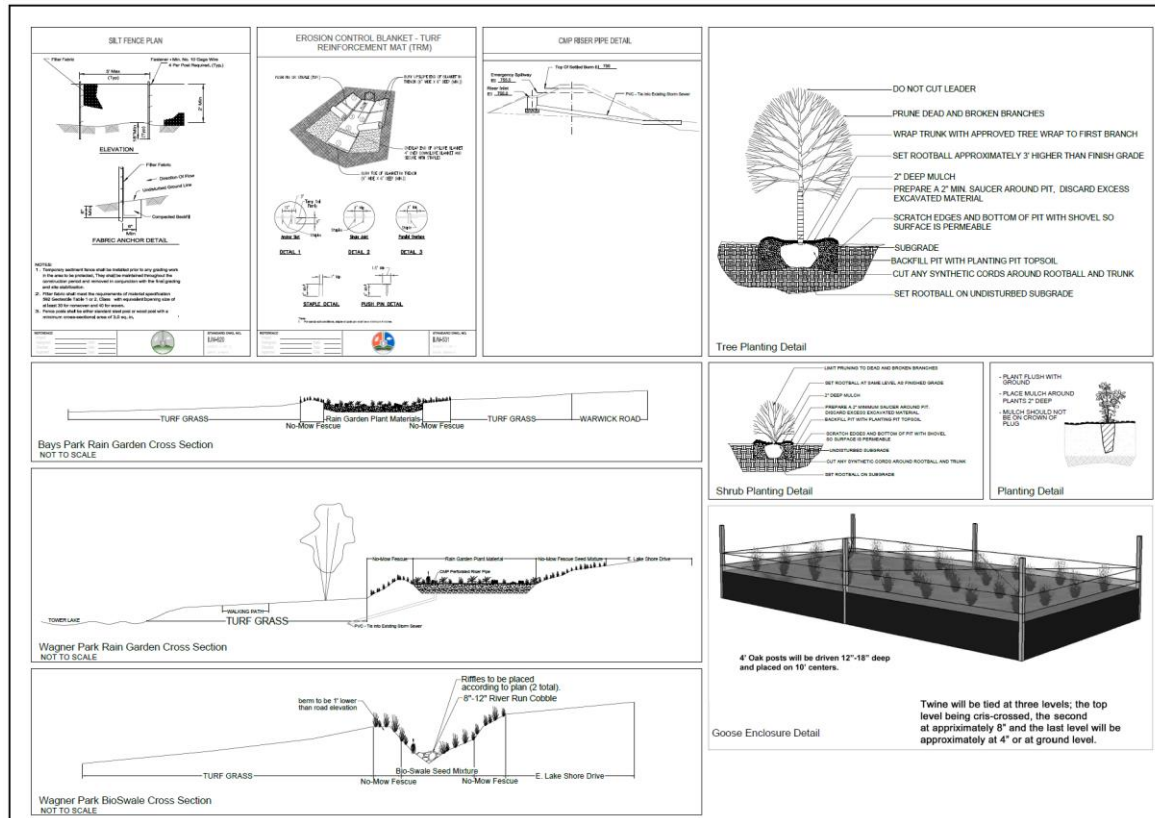
### Illustration #6 - Bays Park Catchment Area



### Illustration #7 - Garden location within Bay's Pk

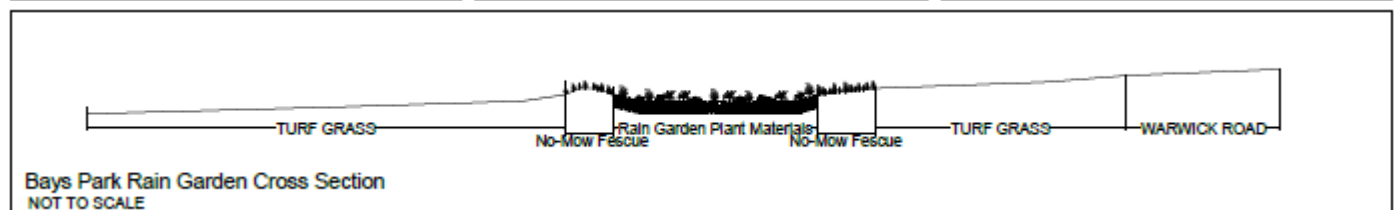


## Illustration #8a Bays Park Plan Details



Construction commenced in Bay's Park in April 2017 with the excavation of the park (see illustrations XXXXX) and the construction of a 7,800 sq ft garden with a gravel substrate, tied in to a natural layer of sand for added infiltration. Runoff from the roadway swales and drainage pipes were diverted into the garden to ensure as much of the stormwater was captured as possible and a riser and spillway system was created to allow the garden to shed water when it was overwhelmed. Its capacity was >12,000 CF and it was designed to infiltrate at a rate of >16 inches of rainfall per hour.

## Illustration #8b - Bays Park Plan Details



The back of the berm had a spillway installed to allow for overflow down the hill towards the Tennis Court Area, and an overflow pipe was installed which was tied into the storm drain systems. Remediated topsoils were added to the garden and it was ready for planting by the end of April 2017.



## Illustration #9 - Bay's Park Raingarden Construction Images







To increase the catching efficiency of the garden both neighbors on adjacent properties agreed to allow us to tie into their storm drains and grade their properties to route runoff from their land into the garden directly

**Illustration #10 - Tie in to neighboring property to the North**





**Illustration #11 - Tie in to neighboring property to the South**



**Illustration #12 Engineering Construction completed at Bay's Park**





## Planting

A group of resident master gardeners in combination with the ENCAP plant biologist selected plants that would be suitable for the Bay's Park Raingarden. Selection criteria included:

**Table #3 Selection criteria for native plants**

Grow in sunlight	Staged flowering during the season
Grow in shade	Attractive to pollenators
Tolerant of mostly wet conditions	Monarch friendly
Tolerant of mostly dry conditions	Complimentary colors

Since part of the garden was in shade, part sunny, part would go dry and part mostly stay wet, these were essential criteria for plants to survive, but selection was largely around the goal of educating the community that raingardens could be beautiful and havens for birds and insects, and not just areas of prairie grass which was a popular misconception.

In the end the following plants were selected and approx. 3000 plugs installed in time for the grand opening in July 2017 :

**Table #4 - Plant species in Bay's Park**

Common Name	Species
Obedient Plant	Physostegia virginiana
Prairie Dropseed	Sporobolus heterolepis
New England Aster	Symphyotrichum novae-angliae
Nodding Wild Onion	Allium cernuum
Swamp Milkweed	Asclepias incarnata
Blue Flag Iris	Iris versicolor
Wild Bergamot	Monarda fistulosa
Foxglove Beardtongue	Penstemon digitalis
Cardinal Flower	Lobelia cardinalis
Wild Geranium	Geranium maculatum
Purple Prairie Clover	Dalea purpurea
White Wild Indigo	Baptisia leucantha
Rough Blazing Star	Liatris aspera
Boneset	Eupatorium perfoliatum

**Illustration #13 - Plugs planted in Bay's Park**







### **Grand opening and education event**

On July 4<sup>th</sup> 2017 the Raingarden and Bioswale Phase I at Bay's Park was officially opened. President Parro of the Village of Tower Lakes and President Young of Tower Lakes Improvement Association performed the opening jointly. In attendance were past Village President Leitner and past TLIA President Hay who, in part, jointly initiated the project during their terms. The event was attended by 134 residents and was an excellent opportunity for an educational event as part of the Project Goals.

### **Illustration #14 - Grand Opening July 2017**





### Early experiences.

The ability to direct runoff into the garden and the changes made by the Village Engineer to roadside swales to capture even more runoff worked exactly as planned

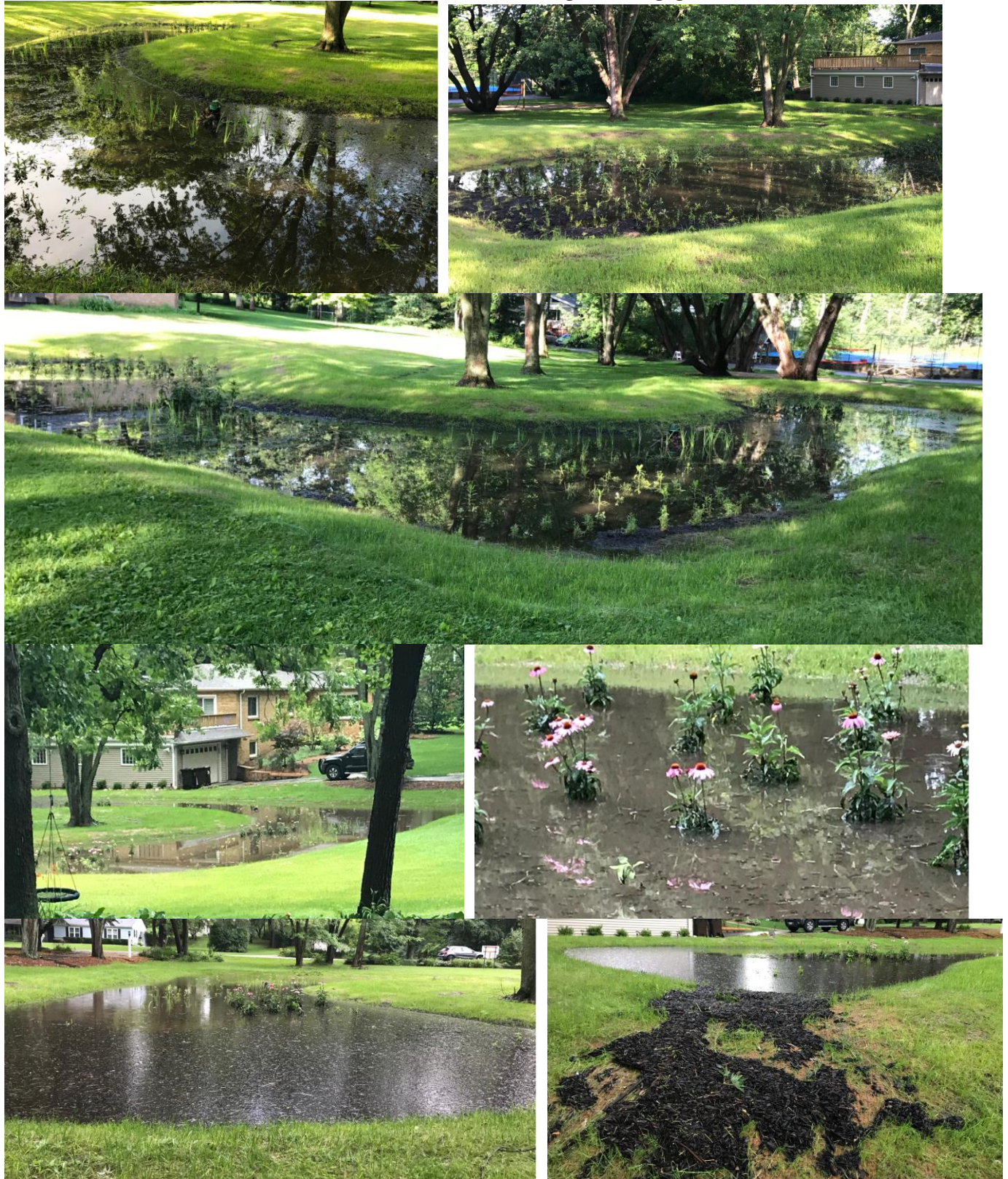
### Illustration #15 - Runoffs captured



In the period May to July the area of Tower Lakes experienced several very heavy rainstorms. Indeed we recorded a 25, 50 and 100yr record high rainfall events in <90 days. During these storms the garden was observed to fill and to overflow firstly into the overflow pipe and subsequently over the spillway. Even without the plants to aid infiltration the ability of the raingarden to detain and infiltrate large volumes of runoff was demonstrated and it performed to expectations. Significantly less flooding was observed below the raingarden in the area of the tennis courts than would have otherwise been expected based on past similar rain events.



**Illustrations #16 - Heavy rain events in 2017 showing flooding garden without overflow**



During the very heavy rainfall events it was observed that the runoff from the spillway caused erosion of a sand volleyball court, which was below the site, and we were obliged to modify a swale



above the court to direct the spillway runoff around the sand and avoid causing damage during heavy rainstorms. This modification was made in spring of 2018.

#### **Illustrations #17 - Erosion of volleyball Court**



#### **Maturation of the plants**

It is expected that it takes three growing seasons for the plants in the garden to mature. During that time weeding is required to ensure that invasive species do not get a beginning and avoid them overwhelming potentially the deep rooted native plants. It was also important to observe the plants as they matured to determine if any plants were in the wrong location with respect to sunshine, shade, wet or dry conditions and to ensure that no-one species overwhelmed others.

Initial floods did take their toll on some plants and we had some initial losses in 2017 which were replanted with Cone Flowers and Iris in 2018. Overall the plants thrived, in some cases too well. During 2018 it was observed that the Obedience Plant was taking over and crowding out some of its neighbors. Early growth in 2019 showed that this would be even more of an adverse impact if left unchecked and in Spring of 2019 a decision was taken to remove the Obedience Plant from the garden completely. The environment created was so aligned to its growing requirements to effectively allow this native plant to become a Native Invasive species. This phenomena was highlighted in our education.

Overall the garden looked very attractive in 2018 and became a haven to pollinating insects and birds especially Humming Birds and Monarch Butterflies which had been specific targets in the plant selection.



## Illustration #18 - Garden in bloom



### Storm Water Detention and Infiltration

One of the primary purposes of the Bay's Pk Raingarden and Bioswale Project was to capture, detain and allow infiltration of stormwater runoff from the east side of the Village. Prior to the project flooding was a major issue below Bays Park in the area of the Tennis Courts. Major rainfall events in 2015 and 16 were recorded photographically and compared to similar, even heavier rains (25, 50 and 100 year high) events in 2017 and 2018. The positive effect was observed to be highly impactful. Flooding was reduced dramatically and in combination with some changes to road drainage has been almost eliminated. Even in a recent event when the garden was overwhelmed the level of flooding at the courts was minimal at <6 inches and had disappeared within a couple of hours. Prior to the Project it was not uncommon to see 3-4feet of flooding which would take many days to clear. Albeit not scientific data this empirical observations are compelling evidence of the powerful impact that a well located engineered raingarden and bioswale project can make on runoff and flooding.

Prior to the garden 100% of the runoff would have made its way to the lake directly carrying with



it all of the nonpoint source pollution. Today the vast majority of east side runoff is captured, detained and infiltrated into the land and air via the plants

**Illustration #19 - Typical floods before the Raingarden**



**Illustration #20 - recent 25 year high rainfall at the Tennis Courts**





### Illustration #21 - New Village drainage



Recent rain events in 2019 have shown the garden to function very well at detention and infiltration with the garden rarely cresting the overflow or the spillway even in "Normal" heavy rain events (Normal being <25 yrs highs)



## Illustrations #21 - High rain events in 2019





## Phase Two and Three - Wagner Park Raingarden and Wetland Restoration

Situated on the east side of the lake Wagner Park (aka East Boat Landing) was selected because it is capable of capturing and detaining large volumes of lawn and road runoff from the houses on the east side, able to be tied into several storm drains and is in a prime showcase location, close the beach, and adjacent to the heart of the village. From an education perspective the location gave excellent visibility to the Tower Lakes Raingarden and Bioswale Project.

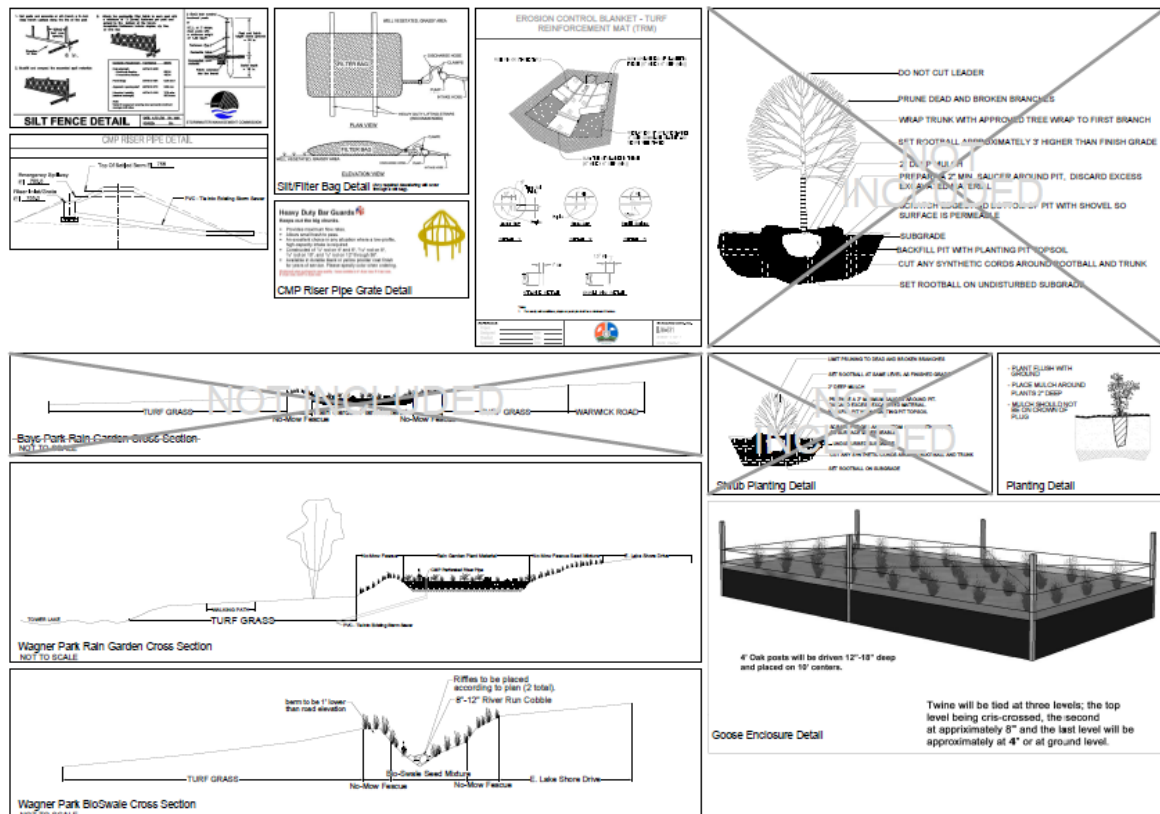
**Illustration #22 - Catchment Area for Wagner Park**



## Illustration #23 - Garden and Wetland Restoration location within Wagner Pk



## Illustration #24 - Detailed plans for Wagner Park





Construction began in Wagner Park in April 2019 with the excavation of the engineered raingarden. Bad weather intervened and only the erosion control and signage was put in place.

**Illustration #25 - Erosion control in place at Wagner Park**



By middle of May we were able to start excavation and by the end of May 2019 the raingarden construction was in place.

**Illustration #26 - Tying into the existing storm drain**





**Illustration #27 - Construction underway at Wagner Park**



This rain garden is designed to detain and infiltrate up to 16 inches of rainwater runoff per hour and covers an area of approx. 5,000 sq ft with a detention capacity of >8,000 cu ft. Immediately adjacent to the garden and area of 17,000 sq ft of mowed park which was within the wetland delineation and always marshy, was restored to native wetland.

In consultation with the Village Engineer a decision was taken to remove a storm drain and tie directly into the garden by berming. This was felt to be advantageous to speed of infiltration and to maximize runoff capture.



**Illustration #28 - Ongoing construction with removal of storm drain**







The garden was bermed to capture the maximum runoff from storm drains, road swales and adjacent properties. Its overflow was tied into the storm drain down to the lake and at the back a spillway was installed to allow for egress of water if the garden is occasionally overwhelmed. By the end of May the initial construction was completed and the garden was ready for topsoil, plants and mulch in June



**Illustration #29 - Completion of engineering construction phase**









During May the turf grass which was in the area of the wetland to be restored was treated with a herbicide which was safe to use proximal to the lake.

**Illustration #30 - Wetland restoration area turf grass killed in preparation for seeding.**



The Wetland Area seeding did not grow fast enough and by mid June had turned into a muddy area with little growth. Late in June it was reseeded with more of the same mix and a straw blanket applied to assist seed growth.

**Illustration #31 - Wetland Area Mid June**





### Illustration #32 - Wetland with additional seeding and straw blanket applied



#### Planting and Seeding

Wetland Restoration was performed using two seed mixes. First a fast growing mix was added to help stabilize the land and avoid erosion

**Table #5 - Fast Growing Seed Mix**

Temporary Matrix		
Scientific Name	Common Name	lbs/acre
Avena Ssativa	Seed Oats	32.00
Elymus virginicus	Virgin Wild Rye	4.00
Lolium multiflorum	Italian Rye Grass	4.00

Then a much larger mix of wetland plants that are slower to mature but more colorful and more attractive to wildlife was added.

**Table #6 - Mature Seed Mix**

Enhanced Wetland Seed Mixture			Enhanced Wetland Seed Mixture		
Scientific Name	Common Name	lbs/acre	Scientific Name	Common Name	lbs/acre
<i>Liatris pycnostachya</i>	Prairie Blazing Star	0.313	<i>Asclapias incarnate</i>	Swamp Milkweed	0.125
<i>Liatris spicata</i>	Marsh Blazing Star	0.188	<i>Aster novae-angliae</i>	New England Aster	0.125
<i>Lobelia syphilitica</i>	Great Blue Lobelia	0.031	<i>Bidens Cemus</i>	Nodding Bur Marigold	0.750
<i>Mimulus ringens</i>	Monkey Flower	0.031	<i>Calamagrostis canadensis</i>	Blue Joint Grass	0.500
<i>Monarda fistulosa</i>	Wild Bergamot	0.125	<i>Carex bebbii</i>	Bebb's Oval Sedge	0.063
<i>Panicum virgatum</i>	Switch Grass	1.000	<i>Carex greyi</i>	Common Bur Sedge	0.031
<i>Phytostegia virginians</i>	Obedient Plant	0.063	<i>Carex grisea</i>	Wood Grey Sedge	0.031
<i>Poa Paustris</i>	Marsh Blue Grass	0.063	<i>Carex normalis</i>	Spreading Oval Sedge	0.063
<i>Pycnanthemum virginicum</i>	Common Mountain Mint	0.125	<i>Carex Vulpinoideae</i>	Brown Fox Sedge	0.500
<i>Ratibida pinnata</i>	Yellow Coneflower	0.250	<i>Cassia fasciculata</i>	Partridge Pea	0.188
<i>Rudbeckia hirta</i>	Black-eyed Susan	0.250	<i>Elymus canadensis</i>	Canada Wild Rye	1.500
<i>Scirpus atrovirens</i>	Dark Green Rush	0.500	<i>Elymus virginicus</i>	Virginia Wild Rye	1.500
<i>Silphium laciniatum</i>	Compass Plant	0.188	<i>Epilobium coloratum</i>	Cinamon Willow Herb	0.015
<i>Silphium perfoliatum</i>	Ciup Plant	0.250	<i>Eupatorium perfoliatum</i>	Common Boneset	0.015
<i>Solidago ridellii</i>	Riddell's Goldenrod	0.125	<i>Glyceria striata</i>	Fowl Manna Grass	1.000
<i>Spartina pectinata</i>	Prairie Cord Grass	1.000	<i>Helenium autumnale</i>	Sneezeweed	0.125
<i>Verbena Hastata</i>	Blue Vervain	0.063	<i>Iris virginica shrevei</i>	Blue Flag Iris	0.125
<i>Vernonia fasciculata</i>	Common Ironweed	0.125	<i>Juncus tenuis</i>	Path Rush	0.031
<i>Veronicastrum virginicum</i>	Culver's Root	0.063	<i>Juncus torreyi</i>	Torrey's Rush	0.031
<i>Zizia aurea</i>	Golden Alexader	0.125			

A goose deterrent fence comprised of fishing line and garden canes was erected around the wetland to reduce the observed impact of geese feeding on the seeds

2,000 Plugs were added to the garden from the following list of selected plants. They will be monitored twice a month and watered as needed to ensure survival

**Table #7 - Wagner Park Plant List**

Wagner Park Plants	
Common Name	Scientific Name
Nodding Wild Onion	<i>Allium cernuum</i>
Swamp Milkweed	<i>Asclepias incarnata</i>
New England Aster	<i>Aster novae-angliae</i>
Brown Fox Sedge	<i>Carex vulpinoidea</i>
Wild Geranium	<i>Geranium maculatum</i>
Prairie Alumroot	<i>Heuchera richardsonii</i>
Blue Flag Iris	<i>Iris virginica shrevei</i>
Cardinal Flower	<i>Lobelia cardinalis</i>
Wild Bergamot	<i>Monarda fistulosa</i>
Foxglove Beardtongue	<i>Penstemon digitalis</i>
Prairie Dropseed	<i>Sporobolus heterolepis</i>
Golden Alexader	<i>Zizia aurea</i>
Purple Coneflower	<i>Echinacea purpurea</i>
Queen of the Prairie	<i>Filipendula rubra</i>
Smooth Oxeye	<i>Heliopsis heliantheoides</i>
Swamp Mallow	<i>Hibiscus moscheutos</i>
Rough Blazing Star	<i>Liatris pycnostachya</i>
Early Meadow-rue	<i>Thalictrum dioicum</i>



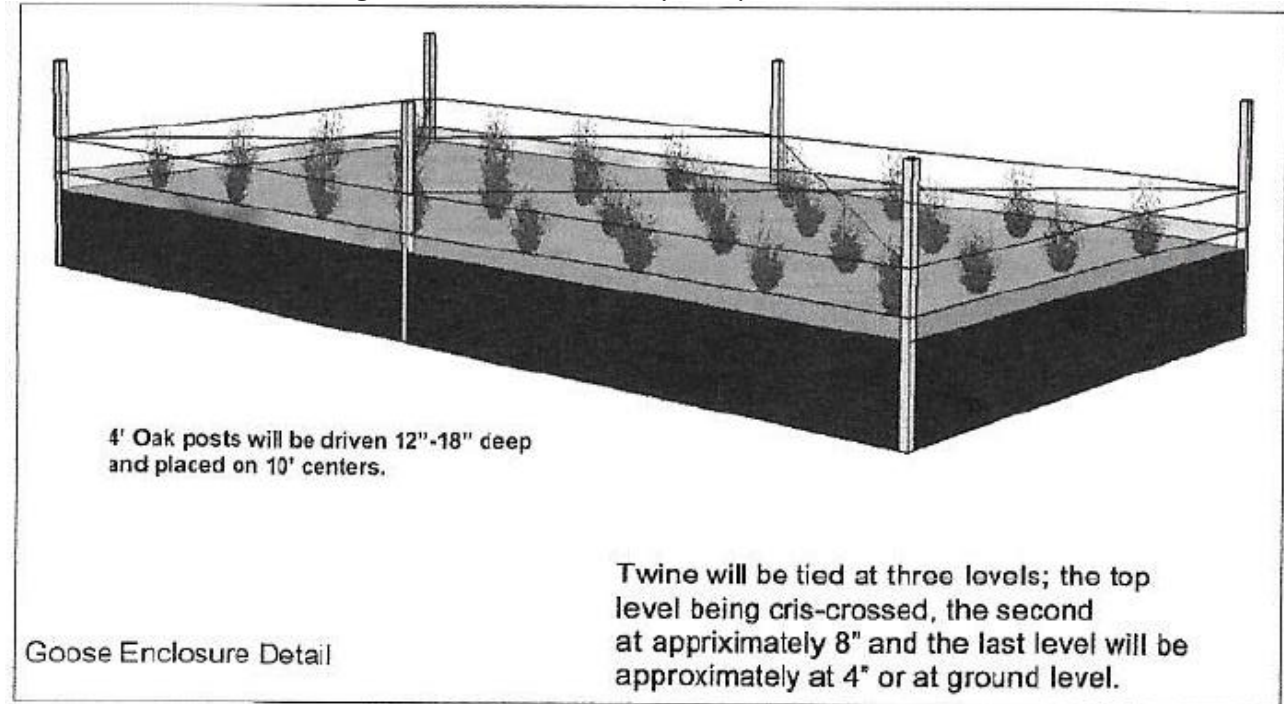
A twine enclosure from oak posts was constructed to help keep wildlife, especially geese out of the garden to avoid them eating the plugs

**Illustration # 33 - Plug planting in Wagner Park**





### Illustration #34 - Anti-geese enclosure (Temporary)



### Soak Test

Just two days after the planting was completed we experienced a cloudburst weather event. Approx one inch of rain fell in 30 mins in a cloudburst. The garden retained successfully all of the runoff and remained well below the overflow pipe and the spillway

### Illustration #35 - First rainfall event in Wagner Park







The official opening of the garden and wetland restoration was held on July 4<sup>th</sup> 2019, two years after the opening of Bay's Pk. We had 34 residents in attendance and a short address was given by both the Village and the TLIA Presidents. Invitations were sent also to Lake County SWMC, IL EPA, ACE, BACT and ENCAP. IN attendance, visiting from California, was Mr Brian Wagner, son of one of the original Tower Lakes residents Mr Cyril (Cy) Wagner, after whom the park was named.



**Illustration #36 – Wagner Park Dedication Invitation**



**Illustration #37 – Wagner Park Dedication**





### **Project Maintenance**

Each garden had two years of professional maintenance included in the RFP bid. During the period July 2017 to June 2019 ENCAP Inc have regularly visited to weed, replace non viable plants, thin out excessive overgrowth and mulch the Bays Park Raingarden. During the period July 2019 to June 2021 they will do same for the gardens at Wagner Park.

Following the period of initial maintenance the Village and the Homeowners Association plan to retain professional maintenance to support the health of the gardens into the future.

### **Illustration #38 - Maintenance at Bays Park**





## Community Education

The third key goal of the Tower Lakes Raingarden and Bioswale Project is Community Education. Since the lake is the most precious asset of Tower Lakes, protecting its health and well being is critical. As a shallow mud bottomed lake it is particularly susceptible to external influences such as temperature, rainfall and inbound nutrients and pollutants. All runoff from stormwater finds its way into the lake unless measures are taken to infiltrate it into the soil substructure. It carries without both nonpoint source pollutants and nutrients. Measures have been taken through community awareness and by Village Ordinances to reduce this impact such as a rigorous septic inspection program and the banning of Phosphorus based fertilizers. In the works is a groundswell of public awareness around the use of Coal Tar driveway sealants which we hope will also lead to their elimination. A key element of this project was to raise awareness within the community and in adjacent communities, especially those upstream of Tower Lakes whose waters are in the area known as the Tower Lakes Drain that by detaining and treating stormwater runoff through raingardens and bioswales we can all make a difference in the health of our lake, and ultimately reduce the pollutant load which makes its way from Tower Lakes into the Fox River and ultimately into the Mississippi.

At every stage of this project there have been multiple methods of raising awareness employed including town hall meetings, presentations to Village and Association Boards, face to face meetings, frequent newsletter articles, presentations to Illinois Lake Management Association, Tower Lakes Drain Partnership, 9 Lakes Associate, Barrington Area Conservation Trust, Flint Creek Watershed Group, Lake County Stormwater Management Council, Citizens for Conservation and many more. Focus of these educational opportunities was typically on the impact of raingardens and how easy and simple they were to construct in homeowners properties. In close collaboration with BACT we have encouraged homeowners to certify their own properties under the BACT Conservation@Home project

## Illustration #39 - Conservation@home



### Conservation@Home

Education, Support, Recognition



*Conservation@Home*, a regional program, educates, supports and recognizes homeowners who incorporate environmentally friendly practices into their own yard. The foundation of the program is to encourage installation of native plants into home landscaping creating friendly habitats for wildlife, capturing storm water using rain barrels or rain gardens (garden beds planted with native plants), and environmentally friendly lawn care.

<https://www.bactrust.org/conservationhome/>

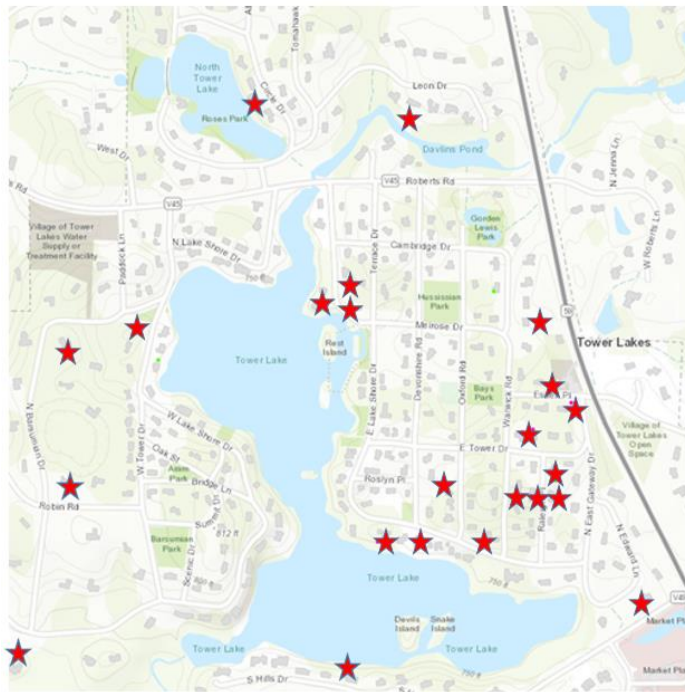


Prior to this project on only two homes in the community had raingardens, now we have over twenty raingarden or shoreline filtration beds exist. These can be tracked and viewed via the interactive map from the Chicago Living Corridors project:

<https://tcfwatersheds.maps.arcgis.com/apps/webappviewer/index.html?id=cfeedc632f454f20b8d384edbc527114>

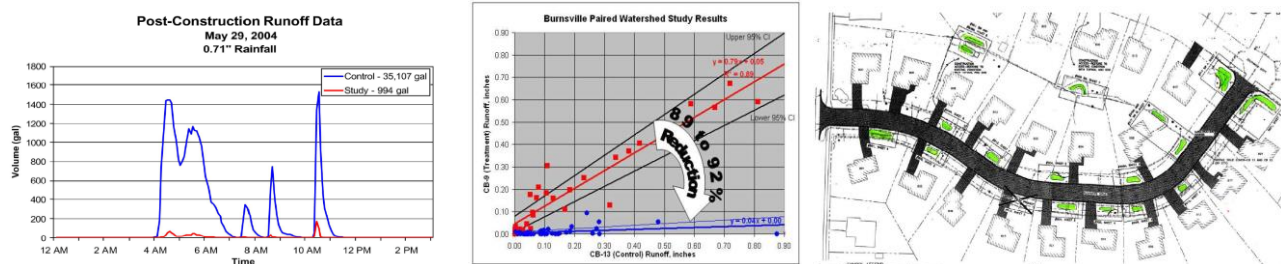
The pink dots mark gardens certified by BACT under their Conservation@Home initiative and the green dots show homeowners who have had Citizens for Conservation certification.

#### Illustration #40 – Certified conservation gardens in Tower Lakes as of June 2019



Educational materials included references to the seminal work at Burnsville MN and easy guides on simple raingarden construction.

#### Illustration #41 – Impact of raingardens at Burnsville MN



Overall we believe that this project has succeeded in raising awareness in community to the positive benefits of raingardens in reducing pollution and nutrient loading on the lake, and to the simplicity of their construction. It has also helped dispel the myth of what raingardens are and replace it with the understanding that they can be areas of natural beauty attractive to pollinators, and birds. That they are low maintenance once built and need not be expensive to build or maintain.



**Illustration #42 - Images of homeowners raingardens in Tower Lakes**















As an enduring part of the community education, a sign was erected in Bays Park which identifies the purpose and the content of the park and acknowledges the generosity of IL EPA and Lake County SWMC



## Illustration #43 – Bays Park Permanent Signage



### Educational Fliers

A trifold educational flier was also created, and distributed widely through the community at the opening of the Wagner Park Raingarden and through various community garden club and other meetings.



[illegible]

In June 2019 The Tower Lakes Garden Club held its annual "Garden Walk" Event. This year they focused on the positive impact of raingardens as areas of natural beauty in the community. In total 29 members spent 2.5hrs visiting two local resident raingardens and the two Tower Lakes Gardens including a presentation by the project manager.

### Illustration #45 - Tower Lakes Garden Club Raingarden Walk

**TLIA Grounds Beautification Garden Club**  
**Garden Walk**

**Wednesday, June 19 at 6:00 pm**  
**Rain or shine! Dress for the weather!**

The tour begins with a presentation by Andy Hay at the new community Blowsdale/Rain Garden at Wagner Park and continues with tours of two Tower Lakes residential gardens also featuring rain garden installations:

**Gabe and Mary Solymossy** 207 E. Lake Shore Drive  
**Andy and Anne Hay** 112 E. Tower Drive

Park at Wagner Park or at the beach. Please carpool if possible.  
Free to members. \$5 for guests.  
Please bring white wine or an appetizer to share to the last house.  
RSVP to: [gardenclub@tlia.org](mailto:gardenclub@tlia.org) or  
[towerlakesgardenclub@gmail.com](mailto:towerlakesgardenclub@gmail.com)

RSVP to [gardenclub@tlia.org](mailto:gardenclub@tlia.org) or  
[towerlakesgardentclub@gmail.com](mailto:towerlakesgardentclub@gmail.com)









## Project Costs

Original Project Cost Estimates were

<b>TOTAL PROJECT COST:</b>	\$ 266,250.00	
<b>Grantor Share:</b>	\$ 159,750.00	60% of Total project cost
<b>Grantee Share:</b>	\$ 106,500.00	40% of Total Project cost

**Table #8 - Original Project Cost Estimates**

SECTION A -- STATE OF ILLINOIS FUNDS				
Revenues	Year 1	Year 2	Year 3	TOTAL
(a). State of Illinois Grant Amount Requested	\$ 70,500	\$ 61,250	\$ 28,000	\$ 159,750
BUDGET SUMMARY STATE OF ILLINOIS FUNDS				
Budget Expenditure Categories <i>OMB Uniform Guidance Federal Awards Reference 2 CFR 200</i>	Year 1	Year 2	Year 3	TOTAL
1. Personnel (Salaries & Wages) 200.430	\$ -	\$ -	\$ -	\$ -
2. Fringe Benefits 200.431	\$ -	\$ -	\$ -	\$ -
3. Travel 200.474	\$ -	\$ -	\$ -	\$ -
4. Equipment 200.439	\$ -	\$ -	\$ -	\$ -
5. Supplies 200.94	\$ 26,500	\$ 24,250	\$ -	\$ 50,750
6. Contractual Services (200.318) & Subawards (200.92)	\$ 7,000	\$ 7,000	\$ 28,000	\$ 42,000
7. Consultant (Professional Services) 200.459	\$ -	\$ -	\$ -	\$ -
8. Construction	\$ 37,000	\$ 30,000	\$ -	\$ 67,000
9. Occupancy (Rent & Utilities) 200.465	\$ -	\$ -	\$ -	\$ -
10. Research & Development (R&D) 200.87	\$ -	\$ -	\$ -	\$ -
11. Telecommunications	\$ -	\$ -	\$ -	\$ -
12. Training & Education 200.472	\$ -	\$ -	\$ -	\$ -
13. Direct Administrative costs 200.413	\$ -	\$ -	\$ -	\$ -
14. Miscellaneous Costs	\$ -	\$ -	\$ -	\$ -
15. A. <u>Grant Exclusive Line Item(s)</u>	\$ -	\$ -	\$ -	\$ -
B. <u>Grant Exclusive Line Item(s)</u>	\$ -	\$ -	\$ -	\$ -
16. Total Direct Costs (lines 1-15) 200.413	\$ 70,500	\$ 61,250	\$ 28,000	\$ 159,750
17. Indirect Costs* (see below) 200.414	\$ -	\$ -	\$ -	\$ -
Rate: _____ % Base: _____				
18. Total Costs State Grant Funds (lines 16 and 17)	\$ 70,500	\$ 61,250	\$ 28,000	\$ 159,750



SECTION B -- NON STATE OF ILLINOIS FUNDS					
Program Revenues		Year 1	Year 2	Year 3	TOTAL
Grantee Match Requirement __40__% (Agency to populate)					
(b). -Cash		\$ 25,250.00	\$ -	\$ -	\$ 25,250.00
(c). -Non-cash		\$ 81,250.00	\$ -	\$ -	\$ 81,250.00
(d). Other Funding & Contributions		\$ -	\$ -	\$ -	\$ -
NON-STATE Funds Total		\$ 106,500.00	\$ -	\$ -	\$ 106,500.00
BUDGET SUMMARY NON-STATE OF ILLINOIS FUNDS					
Budget Expenditure Categories		Year 1	Year 2	Year 3	TOTAL
OMB Uniform Guidance Federal Awards Reference 2 CFR 200					
1. Personnel (Salaries & Wages)	200.430	\$ -	\$ -		\$ -
2. Fringe Benefits	200.431	\$ -	\$ -	\$ -	\$ -
3. Travel	200.474	\$ -	\$ -	\$ -	\$ -
4. Equipment	200.439		\$ 500	\$ -	\$ 500
5. Supplies	200.94	\$ 2,750	\$ 2,000	\$ -	\$ 4,750
6. Contractual Services (200.318) & Subawards (200.92)		\$ 5,000	\$ 3,000	\$ 3,000	\$ 11,000
7. Consultant (Professional Services)	200.459	\$ 10,750	\$ 4,500	\$ 3,000	\$ 18,250
8. Construction		\$ -	\$ -	\$ -	\$ -
9. Occupancy (Rent & Utilities)	200.465	\$ -	\$ -	\$ -	\$ -
10. Research & Development (R&D)	200.87	\$ -	\$ -	\$ -	\$ -
11. Telecommunications		\$ -	\$ -	\$ -	\$ -
12. Training & Education	200.472	\$ 16,000	\$ 16,500	\$ -	\$ 32,500
13. Direct Administrative costs	200.413	\$ 19,000	\$ 19,000	\$ 1,500	\$ 39,500
14. Miscellaneous Costs		\$ -	\$ -	\$ -	\$ -
15. A. Grant Exclusive Line Item(s)		\$ -	\$ -	\$ -	\$ -
B. Grant Exclusive Line Item(s)		\$ -	\$ -	\$ -	\$ -
16. Total Direct Costs (lines 1-15)		\$ 53,500	\$ 45,500	\$ 7,500	\$ 106,500
17. Indirect Costs		\$ -	\$ -	\$ -	\$ -
Rate: _____ % Base: _____					
18. Total Costs NON-STATE Funds (lines 16 and 17)		\$ 53,500	\$ 45,500	\$ 7,500	\$ 106,500

Illinois EPA Section 319 Financial Assistance Agreement 3191615 provided up to \$159,750 in funding on the basis that The Village of Tower Lakes be responsible for match funding of \$106,500.

The funding match came in the form of cash, split evenly between the Village of Tower Lakes and the Tower Lakes Improvement Association and support by generous grants from LCSWMC to the amount of \$22,000. The remainder of the matching funds were from Inkind Match credit for labor and educational hours which totaled over 1,050 hrs. The total value of the matching contribution over the duration of the contract was >\$115k.

Total costs incurred for the project fell below the original estimates and grants. The main reasons for this were:

- The original projected costs of external consultants were not incurred. Late in 2017 the consultant, Nancy Schumm, who had been contracted to support the grant application, and all aspects of reporting on the project, closed her business. Tower Lakes were unable to find a suitable replacement and the remainder of the project reporting was performed by the Tower Lakes Project Manager. This effectively shifted costs from Consultancy into project manager hours at a much lower cost basis. The total project manager hours recorded as contributing to this project were approx. 240.
- The amount of supplies required to complete the project fell well below projections with much of the materials required being reused based on discovery of good soils and sand layers during construction. Overall the totals for construction and supplies together projected to be \$117,750 came in below, at approx. \$110k

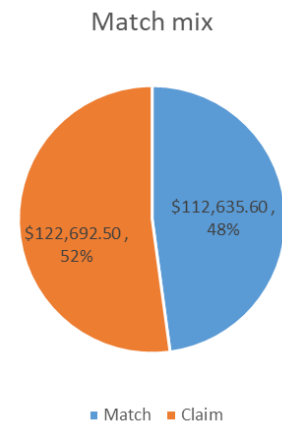


**Table #9 - Final cost summary**

Period of Costs Incurred	September 1st 2016 to June 30th 2021		
Articles or Services Rendered	Total	Match	EPA Inv
(Attach Itemized Vendor Documentation)	Cost	Amount	Amount
Supplies	587.48	587.48	0.00
Contractual/Subawards	7,213.75	2,263.75	4,950.00
Consultant	9,909.05	9,909.05	0.00
Construction	121,737.09	3,994.59	117,742.50
Training and Education	86,288.67	86,288.67	0.00
Direct Administration Costs	9,592.06	9,592.06	0.00
Totals	<b>\$235,328.10</b>	<b>\$112,635.60</b>	<b>\$122,692.50</b>

**Table #10 - Match between EPA costs claimed and matched costs (Target 60:40)**

Quarter	Report #	Match	Claim
Q4 2016	1	\$15,585.26	\$ -
Q1 2017	2	\$11,890.33	\$ -
Q2 2017	3	\$11,766.54	\$ 38,800.00
Q3 2017	4	\$9,549.67	\$ 19,250.00
Q4 2017	5	\$8,320.24	\$ -
Q1 2018	6	\$8,855.30	\$ 2,750.00
Q2 2018	7	\$10,317.95	\$ 800.00
Q3 2018	8	\$13,554.69	\$ 1,000.00
Q4 2018	9	\$8,247.91	\$ 400.00
Q1 2019	10	\$7,714.29	
Q2 2019	11	\$6,833.42	\$48,692.50
Q3 2019	12		\$11,000.00
		<b>\$112,635.60</b>	<b>\$122,692.50</b>



### **Acknowledgements**

The Village of Tower Lakes and the Tower Lakes Improvement Association gratefully acknowledge the support of the following agencies and individuals with whom this wonderful example of small community best management practices in storm water detention and infiltration to reduce nonpoint source pollution would not have been possible.

Illinois Environmental Protection Agency and in particular Scott Tomkins the project manager assigned to support project 3191615. Without the financial support of the 319h grant this project could never have occurred and without Scott's patient advice and support this project manager would not have been able to complete the paperwork involved.

Lake County Storm Water Management Commission whose generous financial support through two grants, helped fund the project and whose staff especially Sharon Osterby, Kelsey Traynoff, Mea Blauer are delightfully helpful and supportive.

Nancy Schumm of Schumm Consulting, whose help was invaluable in driving this project initiative and completing the 319h grant application.

Army Corps of Engineers for their support throughout the process of the permitting.

**Project completed July 14<sup>th</sup> 2019**